



DEPARTMENT OF AGRICULTURE,  
CEYLON.

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BULLETIN No. 34.

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**HEVEA TAPPING RESULTS:  
EXPERIMENT STATION, PERADENIYA,  
1916.**

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**Peradeniya,  
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1917.

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BULLETIN No. 34.

HEVEA TAPPING RESULTS: EXPERIMENT  
STATION, PERADENIYA, 1916.

NTERIM reports on the results of the tapping experiments on the Experiment Station, Peradeniya, have been published in Bulletins 12, 17, and 25. The present Bulletin deals with some of the results of 1916, Series I. of the former Bulletins being omitted, as that experiment is approaching completion, and the final results of it will be published separately. Full details of the previous history of the trees, monthly yields, &c., will be found in the previous Bulletins. All the trees were planted (as stumps) in 1905.

SERIES II.

TAPPING ON ONE-THIRD CIRCUMFERENCE.

A set of experiments, comprising different methods of tapping on one-third the circumference, was instituted by the late Dr. Lock on July 1, 1912. Five rows of twenty-five trees each were selected, and to these was added row 82 B, which had been in tapping continuously on one-third the circumference, alternate days, since October, 1910. All tapping was to be half herring-bone to the left, but, as explained in the previous Bulletin, a mistake was made in tapping the third section of 82 B (December, 1912–December, 1913), on which the cuts were placed to the right instead of to the left. From January 1, 1914, a new row, 80 C, has been substituted for 82 B. Because of this substitution, all the rows are still being tapped on original bark.

*Time Intervals.*

Rows 80 C, 78 A, and 78 B are tapped by four cuts 1 foot apart, to the left, on one-third the circumference, 80 C three

times per week, 78 A twice per week, and 78 B once per week. This part of the experiment consequently corresponds with the well-known Henaratgoda experiment, but deals with younger trees. The following table gives the results up to date :—

Plot No.	..	82 B	..	78 A	..	78 B
No. of trees	..	39	..	25	..	25
Average girth, June, 1912	..	25.3	..	25	..	25
1912 (6 Months).						
No. of tappings	..	82	..	52	..	27
Yield per tree (grams)	..	668	..	635	..	305
1913.						
No. of tappings	..	139	..	86	..	46
Yield per tree..	..	1,053	..	1,209	..	723
1914.						
Plot No.	..	80 C	..	78 A	..	78 B
No. of trees	..	23	..	25	..	25
Average girth..	..	29.3	..	29	..	30.2
No. of tappings	..	182	..	105	..	52
Yield per tree..	..	1,936	..	1,674	..	944
1915.						
No. of tappings	..	157	..	104	..	52
Yield per tree..	..	2,058	..	1,830	..	915
1916.						
No. of tappings	..	154	..	105	..	52
Yield per tree..	..	2,199	..	2,135	..	880

80 C began its third section on December 1, 1916; 78 A began its third section on April 3, 1916; 78 B was being tapped on its second section, which was begun on November 2, 1915.

The total yields per tree from the beginning of the experiment to the end of 1916 were respectively 7,914 grams, 7,483 grams, and 3,767 grams, and the yields per tree per tapping 11.1 grams, 16.6 grams, and 16.4 grams.

If the yields from 1914 only are considered, we find that the total yields per tree are respectively 6,193 grams, 5,639 grams, and 2,739 grams, and the yields per tree per tapping 12.5 grams, 18.0 grams, and 17.6 grams. The yields in lb. per tree during 1916 are 4.8, 4.7, and 1.9.

Comparing the yields per tree for 1916 with those of 1915, it is seen that in the three-times-per-week tapping the increase for 1916 is 6.9 per cent., in the twice-per-week tapping 11.2 per cent., while the once-per-week tapping shows a decrease of 3.8 per cent.

As row 78 B, tapped once per week, has shown a slight decrease since the beginning of 1915, both absolutely and relatively to the other two rows, it is probable that some effect other than the tapping system is in operation.

The experiment continues to demonstrate that the greatest quantity of rubber is obtained by the more frequent tapping, though the difference between two-day and three-day tapping is small on the trees under experiment. On the other hand, the yield per tapping in three-day tapping is much greater than the yield per tapping in two-day tapping. But nothing is gained by extending the tapping interval from three days to one week. It is clear that three-day tapping yields more rubber per unit of bark and per unit of labour than two-day (alternate day) tapping in the case of the trees under experiment.

In previous years the percentage of scrap has increased as the time interval is increased. Three-day tapping has given more scrap than two-day tapping, and weekly tapping more than three-day tapping. Thus, for 1915 the percentages were 10·3, 11·3, and 17·9. For 1916, however, the percentages of scrap were 11·5, 8·8, 15·4. This increase, both absolute and relative, in the case of the alternate day tapping, may be due to the fact that the latex was collected separately from each cut during 1916 in that row.

The following table gives the total rubber per month in grams during 1916; a thick transverse line denotes the completion of tapping on a section :—

1916.	80 C: 22 Trees.*		78 A: 25 Trees.		78 B: 25 Trees.	
	No. of Tappings.	Yield.	No. of Tappings.	Yield.	No. of Tappings.	Yield.
January	.. 12 ..	5691 ..	9 ..	6537 ..	5 ..	2554
February	.. 12 ..	3649 ..	8 ..	2717 ..	4 ..	1303
March	.. 14 ..	3066 ..	9 ..	2402 ..	4 ..	966
April	.. 12 ..	3732 ..	8 ..	2437 ..	4 ..	1597
May	.. 14 ..	4606 ..	9 ..	4531 ..	5 ..	1845
June	.. 13 ..	3390 ..	9 ..	5246 ..	4 ..	1497
July	.. 13 ..	2623 ..	9 ..	4810 ..	4 ..	1973
August	.. 13 ..	3630 ..	9 ..	3695 ..	5 ..	2010
September	.. 13 ..	4026 ..	9 ..	4213 ..	4 ..	1664
October	.. 13 ..	3738 ..	9 ..	4408 ..	5 ..	1973
November	.. 13 ..	4258 ..	9 ..	6341 ..	4 ..	2051
December	.. 12 ..	<u>5971</u> ..	8 ..	6028 ..	4 ..	2575

\* 23 in 1914-1915.

The diminution of the yield during March, the wintering season, is very marked. Compared with January, the yield per tapping was reduced by 54, 63, and 53 per cent. respectively. The corresponding percentages for 1915 were 39, 56, and 59. The rainfall for January, February, March, 1916, was 0.49, 0, and 10.64 inches, respectively; and for the corresponding months of 1915 9.40, 4.17, and 1.85 inches.

*Methods of tapping on One-third Circumference.*

Concurrently with the foregoing, rows 81 A, 81 B, and 81 C have been tapped on one-third circumference, 81 A with two cuts 1 foot apart three times per week; 81 B with two cuts 2 feet apart, the lowest at 2 feet from the ground, three times per week; and 81 C with one cut at 3 feet six times per week. Combined with 80 C, the first two of these provide data for estimating the effect of the different cuts, as well as different methods of tapping the basal 4 feet of the stem. In 80 C the basal 4 feet is tapped by four cuts at the same time; in 81 A it is tapped by two cuts at the base only, with the intention of tapping by two cuts above these later; 81 B will cover the same area as 81 A by the time the tapping on the original bark is completed (*i.e.*, up to a height of 4 feet), but the cuts are placed at a height of 4 feet and 2 feet from the ground, and the intervening cortex is tapped continuously. In 81 C the single cut is at a height midway between the cuts of 81 B, and is tapped daily (Sundays excepted).

The following table gives the yields per tree in grams since 1912, with other necessary details:—

Plot No. . .	..	82 B	..	81 A	..	81 B	..	81 C
No. of trees	..	39	..	25	..	25	..	25
Average girth, June, 1912	25.3	..	27	..	25.6	..	25	
1912 (6 Months).								
Tappings . .	..	82	..	74	..	77	..	153
Yield per tree	..	668	..	663	..	601	..	621
1913.								
Tappings . .	..	139	..	126	..	131	..	254
Yield per tree	..	1053	..	992	..	1306	..	1190
1914.								
Plot No. . .	..	80 C	..	81 A	..	81 B	..	81 C
Average girth	..	29.3	..	32.5	..	30.7	..	30.2
Tappings . .	..	182	..	155	..	155	..	311
Yield per tree	..	1936	..	1718	..	1710	..	1386

1915.						
Tappings..	..	157	..	155	..	154 .. 308
Yield per tree	..	2058	..	1815	..	1587 .. 1535
1916.						
Tappings..	..	154	..	156	..	155 .. 311
Yield per tree	..	2199	..	1863	..	1651 .. 1810

The stages of tapping reached in the different rows are as follows:—80 C began its third section on December 1, 1916; 81 A began its third section on June 1, 1915; 81 B began its second section on January 1, 1915; 81 C began its second section in June, 1914.

The total yields in grams from the beginning of the experiment are 7,914, 7,051, 6,855, and 6,542.

In comparing the yields for any one year, it has to be remembered that the cuts are, at any given time, at different elevations, and this may account for some of the differences in yield. For 1916 the yields in pounds were 4·8, 4·1, 3·6, and 4·0.

In considering the yield per tapping, it is best to take that from the beginning of the experiment, as by that method the difference due to the different elevations of the cuts will be to some degree averaged out. The yields per tree per tapping in grams are 12·5, 10·6, 10·2, and 4·9.

In the first row (80 C), which is tapped with *four cuts* 1 foot apart, the two extra cuts have resulted in an increase of about 20 per cent. over the second row (81 A), which is tapped with *two cuts* 1 foot apart, or over the third row (81 B), which is tapped with *two cuts* 2 feet apart. One would have expected a greater difference in comparison with the third row, as the pattern of the first row may be regarded as the addition of an extra cut *below* each of the cuts of the third.

The difference between the second and third rows is much smaller than would have been anticipated. The comparison would appear to be in favour of the third row, as the second row has now (May, 1917) been tapped out on the basal 2 feet, and, according to the plan of the experiment, tapping must now be carried out higher up, from 4 feet to 2 feet. A diminution in yield is to be expected when tapping is transferred up.

The single cut tapped daily (Sunday excepted) has yielded per tapping a little less than half as much as the two cuts tapped three times per week.



The following table gives the total monthly yields in grams for 1916. A thick transverse line denotes the completion of tapping on a section :—

1916.	80 C: 22 Trees.*		81 A: 25 Trees.		81 B: 25 Trees.		81 C: 25 Trees.	
	No. of Tappings.	Yield.	No. of Tappings.	Yield.	No. of Tappings.	Yield.	No. of Tappings.	Yield.
January	12	5691	13	5196	13	4775	26	4522
February	12	3649	13	3542	12	2873	25	2877
March	14	3066	13	2369	14	2628	27	2687
April	12	3732	13	3985	12	3210	25	3281
May	14	4606	13	3892	14	3829	27	4107
June	13	3390	13	2959	13	3827	26	3136
July	13	2623	12	3316	13	2676	25	3164
August	13	3630	14	4001	13	2881	27	3867
September	13	4026	13	3642	13	3195	26	3763
October	13	3738	13	4366	13	3724	26	3841
November	13	4258	13	4351	13	3851	26	4109
December	12	5971	13	4940	12	3814	25	4091

\* 23 in 1914-1915.

#### V TAPPING *versus* SIMPLE OBLIQUE CUTS.

An experiment was begun in January, 1914, on two groups of ten trees each. One group was tapped on one-third circumference by a single V, beginning at 3 feet; the other was tapped at the same height, on one-third circumference, by a simple oblique cut to the left. Trees were not available for completing the experiment by including a group tapped similarly to the right. The tapping was begun at a height of 3 feet in order to allow prolonged tapping, the general objection to previous experiments on this point being that they had not been continued long enough. The trees were tapped on alternate days. The average girth of the trees tapped by a V was 28.5 inches, and of the other group 28.8 inches (January, 1914).

The following table summarizes the results of the three years' tapping :—

	V Tapping.			Simple Cut.		
	No. of Tappings.	Yield per Tree.	Percentage Scrap.	Yield per Tree.	Percentage Scrap.	
1914	182	1170	11.7	1265	12.2	
1915	179	1422	13.0	1454	13.3	
1916	182	1564	10.5	1517	11.1	

In the first year the advantage in favour of the simple cut was 8 per cent. and in the second year 2.2 per cent.; in the third year there is a difference of 3.1 per cent. in favour of the V. As will be evident, the difference in the case of these trees is negligible. Reference to the table of monthly yields shows that in no year has there been a steady excess in favour

of one group. In 1914, the single cut tapping yielded the more in nine months out of the twelve, though in two of these the yields of the two groups were practically equal; in 1915, the single cut tapping yielded the more in seven months of the year; while in 1916 it yielded the more in six months only. It is proposed to rest these trees for the last six months of 1917, and afterwards reverse the tapping on the next section.

"CHANGE-OVER" TAPPING.

*Quarters.*

In January, 1914, tapping was begun on two groups of seventeen trees each, in row 78 C, to compare the yield obtained by tapping down continuously on one quarter with that obtained on a "change-over" system, *i.e.*, one in which the tapping is periodically transferred to the other side of the tree. This row had been tapped previously, in 1910, by a half herring-bone on half the circumference on alternate days.

The trees were tapped on alternate days by a single oblique cut to the left at a height of 15 inches on one quarter. In one group the trees are tapped down continuously on one quarter; in the other tapping is transferred to the other side of the tree every three months. This period was selected more or less arbitrarily, with the idea of dividing the good and the bad halves of the year equally between the two sides. At the time of transfer both sides are tapped together for six tapplings. In each group the average girth of the trees in December, 1913, was 30.2 inches.

The yields are given in detail in the following table. A thick transverse line denotes the completion of tapping on a section:—

Section: —

78 C.

1914.	Continuous.		Change Over.			
	Tappings.	Yield.	Tapping Days.	Tappings First Side.	Tappings Opposite Side.	Yield.
January	.. 15	820	.. 15	15	—	815
February	.. 14	967	.. 14	14	—	904
March	.. 15	929	.. 15	15	8	979
April	.. 15	1135	.. 15	—	15	918
May	.. 16	1300	.. 16	—	16	1251
June	.. 15	1214	.. 15	15	7	1248
July	.. 15	1539	.. 15	15	—	1415
August	.. 16	1650	.. 16	16	—	1425
September	.. 15	1875	.. 15	9	12	1772
October	.. 15	1745	.. 15	—	15	1634
November	.. 15	2123	.. 15	—	15	1234
December	.. 16	2097	.. 16	3	16	1728

1915.	Continuous.		Change Over.			
	Tappings.	Yield.	Tapping Days.	Tappings First Side.	Tappings Opposite Side.	Yield.
January	14	2197	14	14	—	2470
February	14	1837	14	14	—	1739
March	16	1242	16	16	3	1782
April	15	982	15	3	15	2183
May	15	1233	15	—	15	1358
June	15	1302	15	3	15	1434
July	15	1270	15	15	3	1823
August	15	1270	15	15	—	2295
September	15	1218	15	15	3	1652
October	16	1557	16	3	16	1988
November	15	1403	15	—	15	1537
December	14	1994	14	3	14	3368
1916.						
January	16	1644	16	16	—	4020
February	14	1019	14	14	—	1169
March	16	1213	16	16	3	1344
April	15	1321	15	3	15	1384
May	15	1397	15	—	15	1992
June	15	1180	15	3	15	1984
July	15	1141	15	15	3	2129
August	15	1361	15	15	—	1378
September	15	1431	15	15	3	1687
October	16	1324	16	3	16	2430
November	15	1850	15	—	15	1684
December	15	1734	15	3	15	2492
Yield per tree, 1914			Continuous.		Change Over.	
Do. 1915			1023		901	
Do. 1916			1028		1378	
			978		1394	
Total			3030		3673	

During the first year the continuous tapping yielded more than the "change-over" tapping, but during the second year the positions were reversed, and there was on the total two years' yield a balance in favour of the "change-over" system. It was thought probable that this difference between the two years was due, at least in part, to the difference in the position of the tapping cuts. In the continuous tapping the cut approaches the base twice as rapidly (approximately) as in the "change-over" tapping.

During the third year the continuous tapping has shown a decrease, but the "change-over" tapping has maintained its yield. It may be noted that, of the difference in the total yields per tree (643 grams), 221 grams is due to the abnormally high yield of the "change-over" trees during December, 1915, and January, 1916, when both the cuts on those trees were at the base of the tree.

The total yield per tree from the first two quarters on the trees tapped continuously was 2,657 grams; from the same area on the "change-over" trees it was 2,515 grams. Thus, the yield per unit area of bark was less in the case of the "change-over" trees, while the yield in a given time is greater. This is due to a defect in the experiment. The first two sections of the trees tapped continuously were completely tapped in two years eight months, but on the "change-over" trees they were tapped out in two years one month. The extra tappings at the time of change, 24 per year, account for 1½ inch of bark per annum, and to this is added the extra thickness taken off in re-opening the cut.

The system adopted, of tapping both sides together when changing over, is one which was in vogue when this experiment was begun. It will be evident that the double tapping is wasteful of bark, and it does not produce an equivalent quantity of rubber. And from other experiments in progress, in which the trees have been tapped in alternate months, it would seem to be unnecessary. Though further experiments are required to decide the point, it would appear that the "wound response" is not such a considerable factor, after the trees have been regularly tapped, as it is when tapping is first instituted on virgin trees.

The frequent change, every three months, accentuates the wastage of bark. This period is probably unnecessarily short.

#### *Half Circumference.*

Another "change-over" experiment was instituted at the beginning of 1915 on row 82 C, which had previously been completely tapped by a basal V on half the circumference at 18 inches, from June, 1911, to December, 1914, on the two sides in succession. Thirty-eight trees were divided into two groups of 19 trees each, the trees of the two groups alternating in the row.

The trees were tapped on alternate days by a V on half the circumference 18 inches above the previous tapping, i.e., at 3 feet from the ground, on the side originally tapped first in 1911. In the one group the trees are tapped continuously on one side; in the other tapping is changed to the opposite side every three months. On the "change-over" trees both sides have been tapped together for six tappings at the time of

change. The average girth in January, 1915, was 31·4 inches in the first group and 31·5 inches in the second.

The following table gives the monthly yields:—

1915.	Continuous.		Tapping Days.	Change Over.		Yield.
	Tappings.	Yield.		First Side.	Second Side.	
January	.. 13 ..	1470 ..	13 ..	13 ..	— ..	1545
February	.. 14 ..	1517 ..	14 ..	14 ..	— ..	1469
March	.. 15 ..	1487 ..	15 ..	15 ..	3 ..	1335
April	.. 15 ..	2399 ..	15 ..	3 ..	15 ..	2367
May	.. 15 ..	2249 ..	15 ..	— ..	15 ..	1976
June	.. 14 ..	2242 ..	14 ..	3 ..	14 ..	2169
July	.. 15 ..	2534 ..	15 ..	15 ..	3 ..	2143
August	.. 14 ..	2631 ..	14 ..	14 ..	— ..	1972
September	.. 15 ..	2632 ..	15 ..	15 ..	3 ..	2168
October	.. 15 ..	3069 ..	15 ..	3 ..	15 ..	2689
November	.. 15 ..	2158 ..	15 ..	— ..	15 ..	2285
December	.. 16 ..	3511 ..	16 ..	3 ..	16 ..	3488
1916.						
January	.. 14 ..	2686 ..	14 ..	14 ..	3 ..	2492
February	.. 15 ..	2377 ..	15 ..	15 ..	— ..	1950
March	.. 15 ..	1744 ..	15 ..	15 ..	3 ..	1791
April	.. 15 ..	2980 ..	15 ..	3 ..	15 ..	2277
May	.. 16 ..	2459 ..	16 ..	— ..	16 ..	2259
June	.. 15 ..	2118 ..	15 ..	3 ..	15 ..	2382
July	.. 15 ..	2131 ..	15 ..	15 ..	3 ..	2276
August	.. 16 ..	2175 ..	16 ..	16 ..	— ..	2803
September	.. 15 ..	2005 ..	15 ..	15 ..	3 ..	2308
October	.. 15 ..	2268 ..	15 ..	3 ..	15 ..	2874
November	.. 15 ..	2612 ..	15 ..	— ..	15 ..	3205
December	.. 14 ..	2742 ..	14 ..	— ..	14 ..	2709
Yield per tree, 1915			Continuous.		Change Over.	
Do. 1916			1468 ..		1348	
			1489 ..		1545	
Total			2967		2893	

The results of this experiment have agreed with those of the experiment on quarters, in that there was a slight advantage in favour of continuous tapping during the first year and in the opposite direction in the second. The differences, however, are too small to be of any significance.

From 1917 the double tapping at the time of change has been abandoned in the case of the tapping on halves.

It would appear from these experiments that no increase in yield is to be expected from the system of changing over. But, from Mr. L. E. Campbell's investigations, the bark renewal appears to be better after "change-over" tapping than after continuous tapping on the same side.

June, 1917.

T. PETCH.

